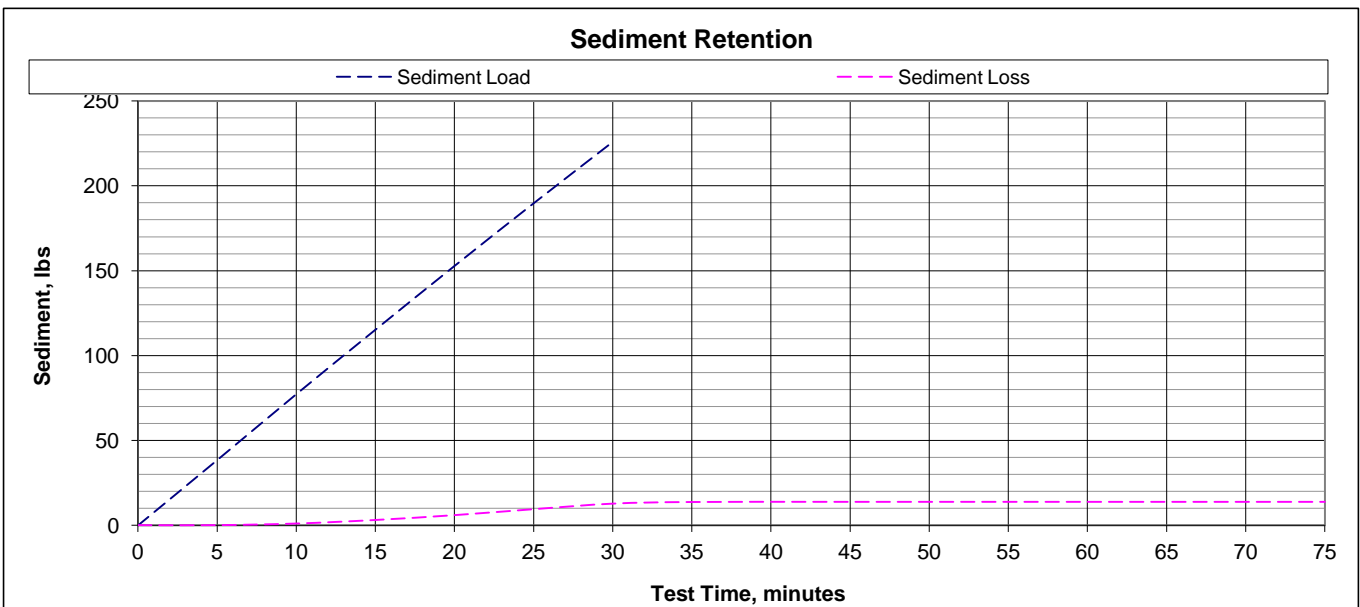
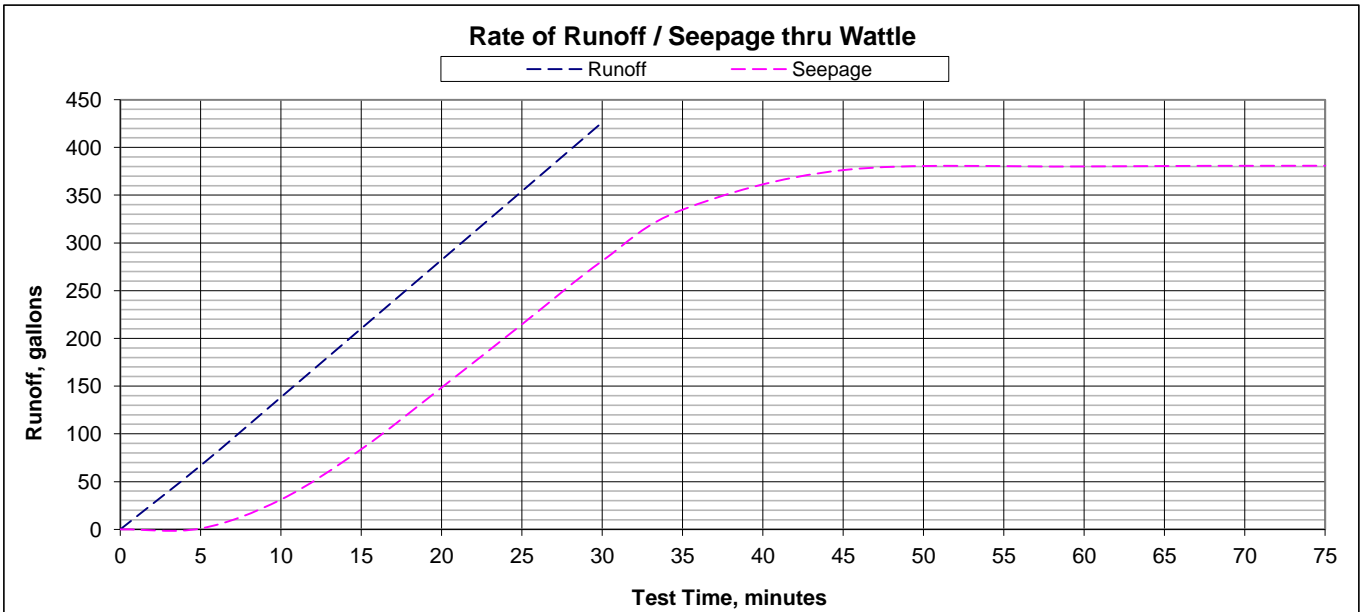


**Project:** ASTM D 7351  
**Client:** Global Management Group  
**Test Date:** 10/28/2022  
**Product / Test Setup:** Ninety7 Wattle 20", Wood Post (Tee-Pee), 4' Spacing  
**Duration:** 75 minutes  
**Water / Soil / Oil Input:** 3555 lbs water 227 lbs soil  
**Sediment Concentration:** Loam @ 6.0%

**Soil Retention Effectiveness:** 93.9%  
**Seepage Effectiveness:** 89.4%

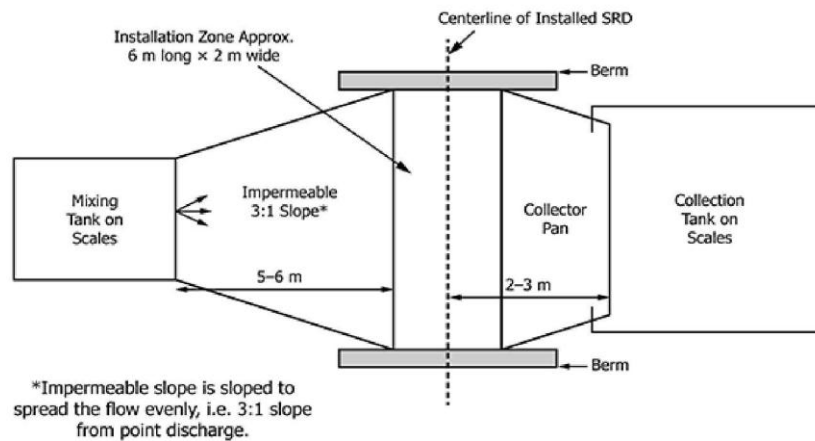


The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose

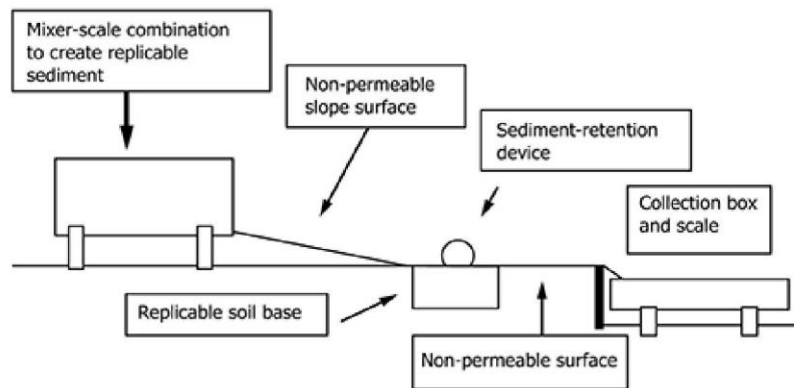
CJS    10/31/22  
 Quality Review / Date

### Testing Overview

The large-scale testing reported herein was performed in general accordance with ASTM D7351. Schematics of the D7351 setup are shown below. For this testing, a simulated toe-of-slope installation 16-ft wide was used. The SRD was installed in the middle of the installation zone according to manufacturer recommendations and exposed to simulated runoff. Sediment-laden water was mixed and discharged onto the 3:1 slope and allowed to run to and seep through the installed SRD. The weight of sediment-laden flow was measured in both the mixing and collection tanks during the test. Additionally, grab samples of the seepage were taken every 5 minutes. The measurement of sediment that passes through the installed SRD is compared to the measured amount in the upstream flow and is used to quantify the effectiveness of the SRD in retaining sediments while allowing continued seepage.



D7351 Schematic (Plan)



D7351 Schematic (Profile)

### Test Setup

The test procedure requires an integrated system of equipment to accomplish the full-scale testing of toe-of-slope SRDs. The system used for this testing includes the following components:

- A mixing tank with an internal paddle device mounted on scales capable of holding/weighing 10,000 lb of sediment-laden water.
- An elevated simulated storm drain inlet with a fully contained area for upstream ponding and downstream accessibility for sampling.
- A tank mounted on scales of sufficient volume to collect all runoff passing the SRD.

Concentrated sediment-laden flow is discharged from the mixing tank to an impermeable slope located between the mixing and the SRD installation zone. The installation zone is about 4 feet by the width of the slope and is comprised of prepared soil subgrade to allow full-scale installation of the SRD. The discharged sediment-laden water is allowed to run up to and seep through, over, and/or under (but not around the ends of) an SRD installed along the toe of the slope. The seepage drains into the collection tank.

Test Soil

The test soil used in the test plots had the characteristics shown in Table 2.

Table 2. Test Soil Characteristics

Soil Characteristic	Test Method	Value
% Gravel	ASTM D 422	0
% Sand		65
% Silt		20
% Clay		15
Liquid Limit, %	ASTM D 4318	26
Plasticity Index, %		5
Soil Classification	USDA	Sandy Loam
Soil Classification	ASTM	Silty Clayey Sand (SC-SM)

Preparation of the Installation Zone

The installation zone subgrade soil is placed and compacted. Compaction is verified to be 90% ( $\pm 3\%$ ) of Standard Proctor density and moisture content is verified to be within  $\pm 3\%$  of optimum moisture content using ASTM D2937 (drive cylinder method).

Toe-of-Slope SRD Installation

The SRD is installed in the installation zone in accordance with the the manufacturer's installation instructions as shown below.



Typical Test Setup and SRD Installation

Mixing Sediment-Laden Runoff

Sediment-laden runoff was created by combining water and soil in the mixing tank and agitating during the test. 3555 lb of water and 227 lb (dry weight) of test soil were combined to create the sediment-laden runoff of 6% (60000 mg/L). These quantities represent the "default" condition given in the standard which is a hypothetical 30-minute, peak flow from a 24-hour, 4-inch rainfall on a 100-ft long x 20-ft wide bare soil slope. The water and soil quantities were adjusted to reflect a 16-ft wide installation.

Specific Test Procedure

After the SRD is installed, the sediment-laden runoff is discharged evenly for 30 minutes while agitation is maintained. The quantity of released runoff is measured at 5-minute intervals by noting the reduction in weight in the mixing tank, adjusting the valve on the tank outlet to increase/decrease flow to stay as close as possible to the target (3782 lb / 30 min = 126 lb / min). For this testing, the discharge flow is introduced to allow it to flow up to and through the SRD. Retention observations and ponding depths, and associated times, are recorded during the test. As runoff passing the SRD system is collected, the weight and volume in the collection tank is recorded and grab samples are taken at 5 minute intervals. Cutoff time is the earlier of 90 minutes or when there is low-volume ponding and minimal discharge. Grab samples are evaluated in a lab to determine turbidity (using a Hach 2100 AN Turbidimeter) and to determine percent dry solids content. Drying of collected sediments is accomplished in a forced air oven at 110°C for a minimum of 24 hours or until all moisture is driven off. All weighing of sediments is done with laboratory scales accurate to  $\pm 0.01$  grams.



16-ft Wide Test Setup / Product Installed



Test Flow Introduced / Initial Ponding



Ponding and Sediment Build-up Behind Product at end of Flow (30 minutes) and at end of Seepage (75 minutes)

APPENDIX - DATA

**ASTM 7351 Soil and Water Retention Effectiveness**

Product: Ninety7 Wattle 20", Wood Post (Tee-Pee), 4' Spacing

Soil: TRI Loam @ 6% Sediment Concentration

Date: 10/28/2022

Start Time: 2:00:00 PM

End Time: 3:15:00 PM

Sample Number	Test Time, minutes	Oil & Grease, mg/L	Turbidity	Total Weight, g	Dry Weight, g	Bottle Weight, g	Dry Sediment Weight, mg	Total Collected Water Wt., g	Total Collected Volume, l	Sediment Conc., mg/l	% Solids	Reservoir Weight, lb	Assoc. Water Discharge, gal	Cumulative Water Discharge, gal	Coll. Tank Depth, in	plot time	SRD Ponding Height, in	Cumulative Soil Loss, lbs	Assoc. Solids Loss, lbs	Soil Retention Effectiveness, %	Water Retention Effectiveness, %			
Upstream														0			0			0				
B0	0	0	99999	392.78	172.12	156.30	15820	64.36	0.25	63280	6.69%	3782	66.8	66.8		5.0		38.4	38.4					
B5	5	0	99999	395.24	171.59	156.79	14800	66.86	0.25	59200	6.21%	3186	71.6	138.4		10.0		77.2	38.8					
B10	10	0	99999	390.66	171.18	157.17	14010	62.31	0.25	56040	6.00%	2550	71.9	210.4		15.0		115.2	38.0					
B15	15	0	99999	386.51	170.41	156.85	13560	59.25	0.25	54240	5.90%	1912	71.9	282.2		20.0		152.8	37.6					
B20	20	0	99999	392.77	170.54	156.63	13910	65.60	0.25	55640	5.89%	1275	71.9	354.1		25.0		189.7	36.9					
B25	25	0	99999	388.81	170.78	157.62	13160	60.41	0.25	52640	5.69%	638	72.1	426.3		30.0		225.8	36.2					
B30	30	-	9258	387.18	168.24	155.15	13090	63.79	0.25	52360	5.64%	0	-	-		-		-	-					
Water in Mixer (lbs): 3555			Soil Added (lbs): 227				Oil Added (g): 0			AVGS: 56200		6.00%		TOTALS: 426.3			225.8							
Downstream														0			0			0				
A0	0	-	4197	371.04	157.52	156.78	740	56.74	0.25	2960	0.35%	0	1.0	1.0	0.0	5	0.0	0.0	0.0					
A5	5	0	7553	377.67	158.08	157.30	780	62.29	0.25	3120	0.35%	8	30.3	31.3	20.0	10	44.0	1.0	0.9					
A10	10	0	99999	359.47	158.05	157.26	790	44.16	0.25	3160	0.39%	262	52.7	84.0	38.0	15	66.0	3.1	2.1					
A15	15	0	99999	370.35	157.46	156.24	1220	56.65	0.25	4880	0.57%	704	64.6	148.7	64.0	20	75.0	6.0	2.9					
A20	20	0	99999	363.75	158.01	156.98	1030	48.76	0.25	4120	0.50%	1246	66.2	214.9	91.0	25	80.0	9.5	3.5					
A25	25	0	99999	363.88	158.85	157.25	1600	47.78	0.25	6400	0.77%	1802	66.5	281.4	118.0	30	85.0	12.8	3.3					
A30	30	0	9136	367.64	157.86	157.00	860	52.78	0.25	3440	0.41%	2360	53.6	335.0	145.0	35	86.0	13.8	1.0	<b>93.88%</b>	<b>10.63%</b>			
A35	35	0	433	366.06	156.94	156.89	50	52.23	0.25	200	0.02%	2808	41.5	376.4	167.0	45	55.0	13.9	0.1					
A45	45	0	476	366.16	157.30	157.24	60	51.62	0.25	240	0.03%	3154	3.8	380.3	185.0	60	29.0	13.9	0.0					
A60	60	0	223	371.53	158.38	158.33	50	54.82	0.25	200	0.02%	3186	0.7	381.0	186.0	75	27.0	13.9	0.0					
A75	75	0	158	352.28	156.89	156.86	30	38.53	0.25	120	0.02%	3192	-	-	-	-	-	-	-					
A90	90	0	0	0.00	0.00	0.00	0	0.00	0.25	0		0	-	-	-	-	-	-	-					
										2403	0.31%	3192	381.0						13.9					
<b>Soil Collected (lbs):</b>				n/a				(avg)		(avg)		(total)		(total)		(approx.)								